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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/532,904 | 04/27/2005 | Peter-Andre Redert | NL 021087 | 3107 |

24737 7590 08/21/2008
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
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| EXAMINER | |
|---|---|
| LA BARR, EDWARD T | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2628 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 08/21/2008 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/532,904 | REDERT ET AL. | |
| | Examiner | Art Unit | |
| | EDWARD T. LA BARR | 2628 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *30 June 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicants' submission filed on 6/30/2008 has been entered.

### *Response to Amendment*

This action comes in response to Applicants' Amendment, filed 6/30/2008. Claims 1-17 are pending.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

**Claims 1-17** rejected under 35 U.S.C. 103(a) as being unpatentable over Gelsey (US Pat. No. 6,344,837). in view of Norman (US Pat. No. 6,154,855).

***Regarding Claim 1. (Currently amended)***

Gelsey discloses a method for visualization of a 3-dimensional (3-D) image comprising:

converting a 3-D scene model into a plurality of 3-D scene points;

(See e.g. col. 9 lines 4-5) into a plurality of 3-D scene points (See e.g. col. 9 lines 4-10 where the 3-D scene point is the point where R intercepts S. See also e.g. Figs 1, 2 and 3);

providing at least a portion of the plurality of 3-D scene points to a 3-D display plane comprising 3-D pixels that are directionally modulated;

(See e.g. col. 9 lines 25-29, where SP = scene point, and DMP = 3-D pixel);

performing at least one of emitting and transmitting the light by each of the 3-D pixels

(See e.g. Fig 3 block 10 and Fig. 4A and See e.g. Abstract "DMP").

Gelsey does not explicitly disclose:

calculating at each of the 3-D pixels a contribution of light from the 3-D pixel to generate at least in part a scene point of the plurality of 3-D scene points.

However, Applicant defines 3-D pixel as "may be a device comprising a spatial light modulator … may contain light sources, lenses, spatial light modulators and a control unit" at Application Specification p.2 lines 18-21. In this view, See e.g. Gelsey Claim 32 "control mechanism" and col. 9 lines 25-29 as above in this way, Gelsey determines its contribution at the 3-D pixel. Norman teaches the use of arrays of local processors for display, with explicit calculation of input (See e.g. Norman col. 2 lines 30-45, col. 7 lines 38-46, col. 9 lines 13-21 and col. 9 ll. 4-10 "...each array cell having access to a global input and having direct optical output means as well as minimal memory and processing means, allowing the array to receive,

decompress and display data transmitted by another apparatus, such as a computer..." Here, each cell receives global data and performs calculations to determine its output.)

It would have been obvious to those having ordinary skill in the art at the time of invention to modify the determination of the contribution of light at each of the 3-D pixels of Gelsey to calculate locally as in Norman. It was known that incorporating a complete miniature data processing system in this manner can have the advantage of overcoming I/O and memory bottlenecks by providing a massively parallel data processing system (See e.g. Norman col. 9 ll. 28-37).

***Regarding Claim 2. (Currently amended)***

Gelsey discloses the method according to claim l, wherein light is emitted and/or transmitted by 2-D pixels comprised within said 3-D pixels, each 2-D pixel directing light into a different direction contributing light to a scene point of said 3-D scene model.

(Applicant defines 2-D pixel as "may be a device that can modulate the emission or transmission of light" at Application Specification p. 2 lines 17-18. In this view, See e.g. Gelsey col. 4 line 54 through col. 5 line 8 especially "centrally located point source of light within … modulation regions" and "light emitted in different directions having the different visual properties appropriate for the scene being displayed.")

***Regarding Claim 3. (Currently amended)***

Gelsey does not explicitly disclose the method according to claim 1, wherein said 3-D scene points are provided sequentially, or in parallel, to said 3-D pixels.

However, Norman teaches the use of parallel arrays of processors (See e.g. Norman col. 2 lines 30-45, col. 7 lines 38-46 and col. 9 lines 13-21).

It would have been obvious to those having ordinary skill in the art at the time of invention to modify the display method of Gelsey to provide 3-D scene points to 3-D pixels sequentially or in parallel as in Norman. It was known that a highly parallel data processing system can have the advantage of overcoming the I/O and memory bottlenecks that plague parallel processors as well as the von Neumann bottleneck of single processor architectures (See e.g. Norman col. 9 lines 27-36).

***Regarding Claim 4. (Currently amended)***

Gelsey discloses the method according to claim 1, wherein the calculation of the contribution of light of a 3-D pixel to a certain 3-D scene point is made previous to the provision of said 3-D scene points to said 3-D pixels.

(See e.g. Gelsey col. 10 lines 1-11. See also Fig. 14, where scene point SP is set equal to Intercept (R,S) in block 72, followed by provision of the scene points to the 3-D pixel in block 74 by setting the modulation region to match SP).

***Regarding Claim 5. (Currently amended)***

Gelsey discloses the method according to claim 1, wherein the contribution of light of a 3-D pixel to a certain 3-D scene point is calculated within one 3-D pixel of one row or of one column previous to the provision of said 3-D scene points to the remaining 3-D pixels of a row or a column, respectively.

(See e.g. Gelsey col. 10 lines 1-11. See also Fig. 14, where scene point SP is set equal to Intercept (R,S) in block 72, followed by provision of the scene points to the 3-D pixel in block 74 by setting the modulation region to match SP).

***Regarding Claim 6. (Currently amended)***

Gelsey discloses the method according to claim 1, wherein a 3-D pixel outputs an input 3-D scene point to at least one neighboring 3-D pixel.

(See e.g. Gelsey col. 9 lines 14-35 where neighboring 3-D pixel is line 17 "... next DMP ..." and 3-D scene point is SP).

***Regarding Claim 7. (Currently amended)***

Gelsey discloses the method according to claim 1, wherein each 3-D pixel alters the co-ordinates of a 3-D scene point prior to putting out said 3-D scene point to at least one neighboring 3-D pixel.

(See e.g. Gelsey col. 9 lines 4-35, where the scene point SP is defined as the point intercept (R,S) in Step 72. In this view See Fig. 13 where the coordinate of the scene point depends therefore on R, this step occurring prior to decision 78 which passes the data to the next 3-D pixel).

***Regarding Claim 8. (Currently amended)***

Gelsey discloses the method according to claim 1, wherein if more than one 3-D scene point needs the contribution of light from one 3-D pixel, the depth information of said 3-D scene point is decisive.

(See e.g. col. 4 lines 49-53 where occlusion depends on viewing direction.)

***Regarding Claim 9. (Currently amended)***

Gelsey discloses the method according to claim 1, wherein 2-D pixels of the 3-D display plane transmit and/or emit light only within one plane.

(See e.g. col. 6 lines 1-24, esp. 18-19).

***Regarding Claim 10. (Currently amended)***

Gelsey discloses the method according to claim I, wherein color is incorporated by spatial or temporal multiplexing within each 3-D pixel.

(See e.g. col. 5 lines 8-24 and Fig. 5. See also col. 5 lines 55-65).

***Regarding Claim 11. (Currently amended)***

Gelsey in view of Norman teach the following elements as developed in claim 1 above:

A 3-D display device, comprising: a 3-D display plane with 3-D pixels, each of said 3-D pixels comprise a control unit located at each of the 3-D pixels for calculating their own contribution to the visualization of a 3-D scene point representing said 3-D scene.

Gelsey does not explicitly disclose wherein said 3-D pixels comprise an input port and an output port for receiving and putting out 3-D scene points of a 3-D scene. However, Norman

teaches such an arrangement (See e.g. Norman col. 32 lines 13-20 where "array cell" comprises a 3-D pixel).

It would have been obvious to persons having ordinary skill in the art at the time of invention to modify the 3-D pixel of Gelsey to incorporate an input and an output port as in Norman. It was known that having cells equipped with direct input and direct output means allows the array to handle input intensive tasks without encountering an input bottleneck (See e.g. Norman col. 32 lines 22-25.)

***Regarding Claim 12. (Currently amended)***

Gelsey does not explicitly disclose the 3-D display device according to claim 11, wherein said 3-D pixels are interconnected for parallel and serial transmission of 3-D scene points.

However, Norman teaches the use of serial/parallel arrays of processors (See e.g. Norman col. 2 lines 30-45, col. 7 lines 38-46 and col. 9 lines 13-21).

It would have been obvious to persons having ordinary skill in the art at the time of invention to modify the interconnection of the 3-D pixels for transmission of 3-D scene points as in Gelsey for parallel and serial interconnection as in Norman. It was known that a highly parallel data processing system can have the advantage of overcoming the I/O and memory bottlenecks that plague parallel processors as well as the von Neumann bottleneck of single processor architectures (See e.g. Norman col. 9 lines 27-36).

***Regarding Claim 13. (Currently amended)***

Gelsey teaches the 3-D display device according to claim 11, wherein said 3-D pixels comprise a spatial light modulator with a matrix of 2-D pixels. (See e.g. Gelsey Fig. 5.)

***Regarding Claim 14. (Currently amended)***

Gelsey teaches the 3-D display device according to claim 13, wherein said 3-D pixels comprise a point light source, providing said 2-D pixel with light.

(See e.g. Gelsey col. 4 lines 54-55 and see generally Gelsey col. 4 line 54 through col. 5 line 54 and Fig. 4C).

***Regarding Claim 15. (Currently amended)***

Gelsey does not explicitly disclose the 3-D display device according to claim 13, wherein said 3-D pixels comprise registers for storing a value determining which ones of said 2-D pixels within said 3-D pixel contribute light to a 3-D scene point.

However, Norman teaches the use of arrays of processors where each processor has its own memory (See e.g. Norman Fig. 10 block 1016, See also col. 2 lines 30-34.)

It would have been obvious to persons having ordinary skill in the art at the time of invention to modify the value determination of pixel contribution of light to a 3-D scene point as in Gelsey to incorporate storage registers as taught by Norman. It was known that systems comprising arrays of processors where each processor has its own memory can have the advantage of removing the von Neumann uni-processor bottleneck and the multi-processor memory bottleneck for parallel applications (See e.g. Norman col. 2 lines 34-36).

**Claims 3 and 11-15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gelsey (US Pat. No. 6,344,837) in view of Norman (US Pat. No. 6,154,855) and Seitz, et al. (US Pat. No. 6,363,170).

***Regarding Claim 16. (Currently amended)***

Gelsey does not explicitly disclose the method of claim 1, wherein the calculating of the contribution comprises calculating whether a current 3-D scene point is closer to a viewer than a past 3-D scene point.

However, See e.g. Seitz, et al. col. 6 l. 66 - col. 7 l. 7. Here, voxel processing involves 1-bit Z-buffering, or occlusion detection which determines whether the current scene pixel is closer to a viewer than the previous 3-D scene point.

It would have been obvious for persons having ordinary skill in the art to modify the contribution calculation of Gelsey to determine relative depth of a scene point as taught by Seitz et al. It was known that use of depth testing can have the advantages of reducing required processing and preventing display of hidden surfaces.

***Regarding Claim 17. (Currently amended)***

Gelsey does not explicitly disclose the 3-D display device of claim 11, wherein the control unit calculates whether a current 3-D scene point is closer to a viewer than a past 3-D scene point.

However, See e.g. Seitz, et al. col. 6 l. 66 - col. 7 l. 7. Here, voxel processing involves 1-bit Z-buffering, or occlusion detection which determines whether the current scene pixel is closer to a viewer than the previous 3-D scene point.

It would have been obvious for persons having ordinary skill in the art to modify the contribution calculation of Gelsey to determine relative depth of a scene point as taught by Seitz et al. It was known that use of depth testing can have the advantages of reducing required processing and preventing display of hidden surfaces.

***Response to Arguments***

Applicants' arguments filed 6/30/2008 have been fully considered but they are not persuasive.

***Regarding Claims 1 and 11***

With respect to claim construction, Applicants argue that the interpretation of the term "determining" does not read upon the 3-D pixel of Gelsey for the reason that the Gelsey pixel is a slave device. However, Applicants have amended the claim language to remove this issue. Accordingly, this argument is moot.

Applicants argue that claims 1 and 11 are not anticipated or made obvious by the teachings of Gelsey alone. In view of Applicants' amendment, these claims have been rejected over further art. Accordingly, this argument is moot.

Applicants also argue that Gelsey in view of Norman do not disclose or suggest the following limitations from the claims:

> "calculating at each of the 3-D pixels a contribution of light from the 3-D pixel"
>
> "performing at least one of emitting and transmitting the light by each of the 3-D pixels that is calculated."

The gravamen of this argument surrounds the terms "calculating" and "calculated." In support, Applicants argue that Gelsey performs the 3-D calculation at a central processor and transfers the data to the 3-D pixels for rendering a scene. Norman is said to be cited for showing another element of the claims and as such would not cure the proposed deficiency in Gelsey.

However as further developed in the rejections above, Norman, in response to Applicants' amendment, is now cited for the purpose of addressing this element of the claim. Accordingly, with respect to Gelsey, this argument is moot, and with respect to Norman, this argument is nonpersuasive.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edward T. La Barr whose telephone number is (571)270-3237. The examiner can normally be reached on Monday-Friday, 9:00 a.m - 5:00 p.m., Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ulka Chauhan/
Supervisory Patent Examiner, Art Unit 2628

ETL